

(12) UK Patent Application (19) GB (11) 2 263 622 (13) A

(43) Date of A publication 04.08.1993

(21) Application No 9300123.8

(22) Date of filing 06.01.1993

(30) Priority data  
(31) 9200259 (32) 30.01.1992 (33) SE

(71) Applicant  
Mölnlycke AB  
  
(Incorporated in Sweden)  
  
S-405 03 Göteborg, Sweden

(72) Inventors  
Stefan Olsson  
Urban Widlund  
Anders Söderbergh

(74) Agent and/or Address for Service  
Boulton Wade Tennant  
27 Farnival Street, London, EC4A 1PQ,  
United Kingdom

(51) INT CL<sup>5</sup>  
A61F 13/15

(52) UK CL (Edition L)  
A3V V1B3B V6C4 V6H1  
A5R RPG

(56) Documents cited  
US 4846823 A US 4808177 A

(58) Field of search  
UK CL (Edition K) A3V  
INT CL<sup>5</sup> A41B, A61F

(54) Disposable absorbent articles

(57) An absorbent article for one-time use only, such as a disposable diaper as shown, incontinence guard, sanitary napkin (Figs. 7 and 8), panty's protector or the like includes at least one hose-like fold 20, 21 (20', 21', Fig. 9) which extends in the longitudinal and/or transverse direction of the article. Mounted in the fold 20, 21 (20', 21') are mutually spaced elastic elements 32, 33 (32', 33') which are fastened to respective end-parts 27, 28 (27', 28') of the fold on respective sides of fold lines 24, 25 on the upper casing layer 1 of the article, although these elastic elements 32, 33 (32', 33') are freely moveable in the intermediate part 29 (29') of the fold. The end-parts 27, 28 (27', 28') of the fold are joined to the upper casing layer 1 in a flat, permanently down-pressed state, whereas the intermediate fold part 29 (29') is forcibly lifted vertically by the action of the elastic elements 32, 33 (32', 33') as the article is fitted to the wearer and consequently curved, so as to form leakage barriers along the side-edges 4, 5 and/or the end-edges 6, 7 of the article.

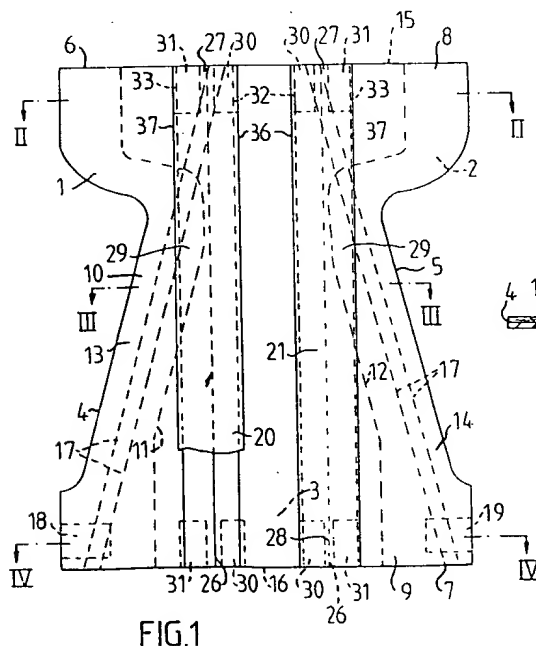


FIG.1

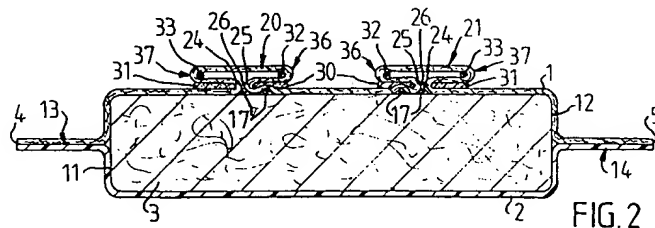


FIG.2

BEST AVAILABLE COPY

BEST AVAILABLE COPY

GB 2 263 622 A

**THIS PAGE BLANK (USPTO)**

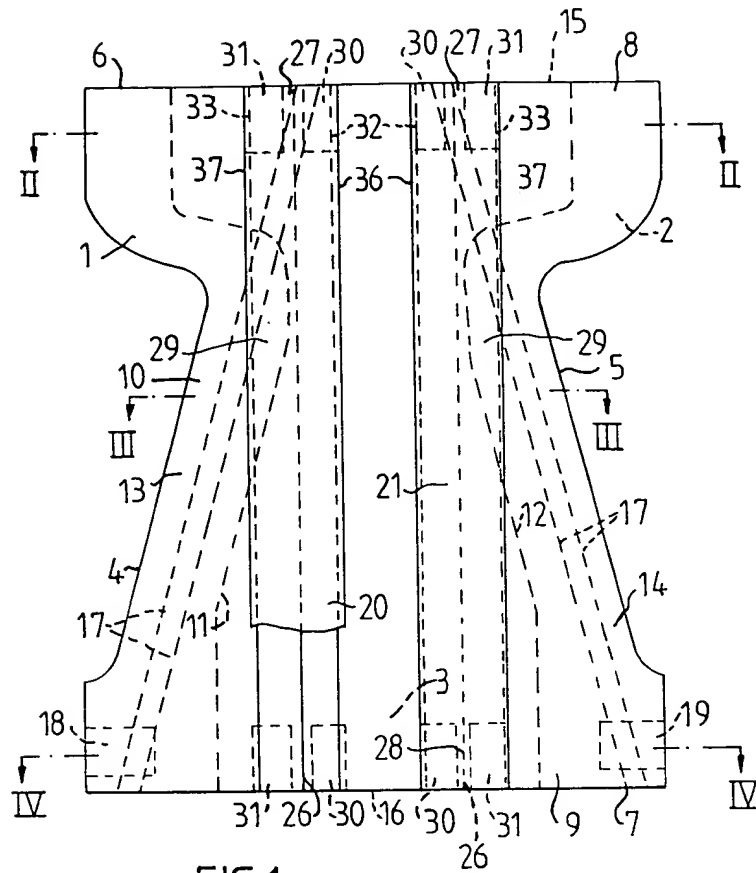


FIG. 1

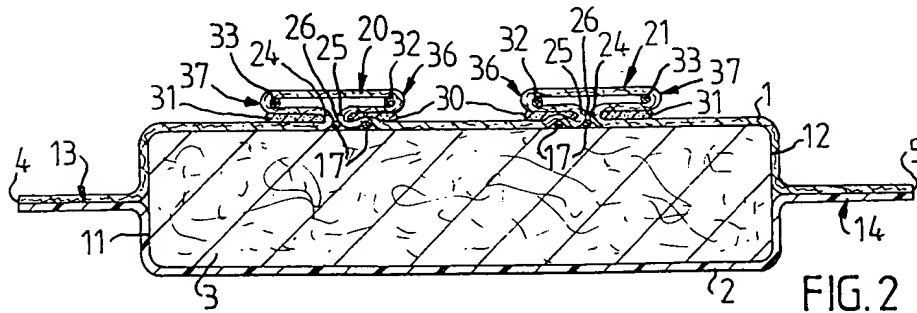


FIG. 2

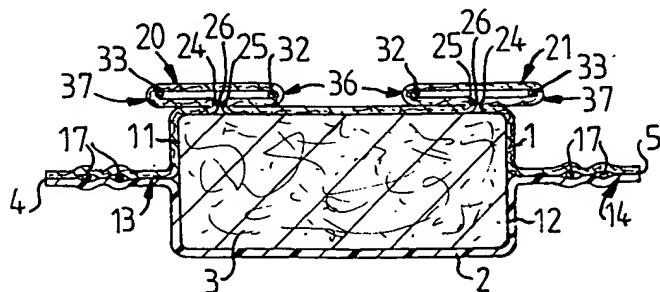


FIG. 3

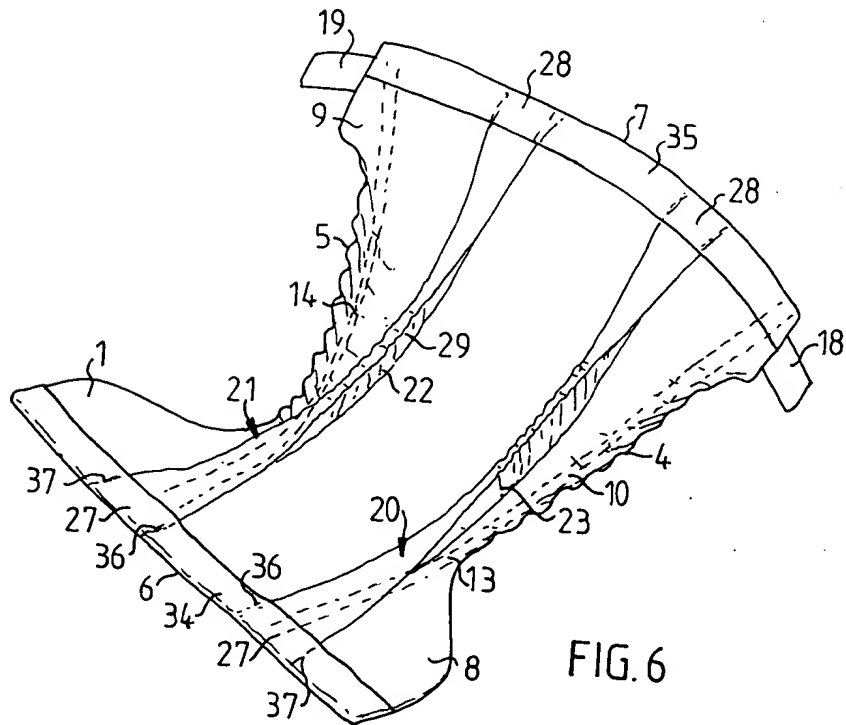
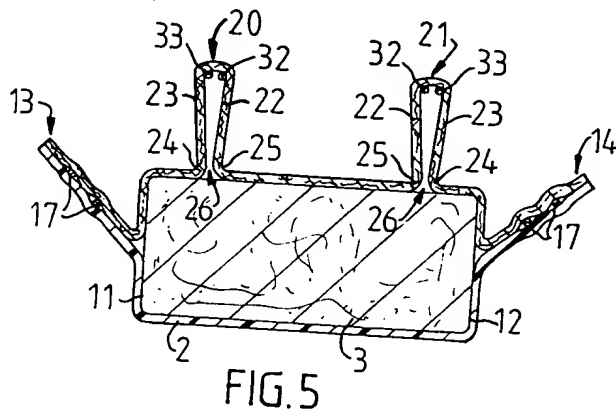
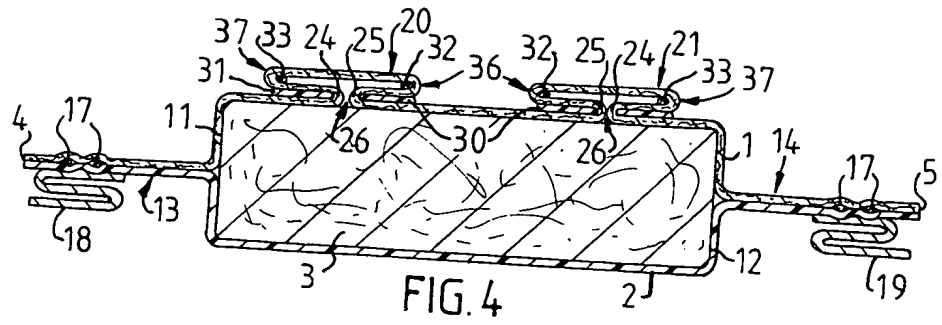


FIG. 8

[illegible]

FIG. 9

**THIS PAGE BLANK (USPTO)**

Absorbent Articles

The present invention relates to a disposable absorbent article, such as a diaper, an incontinence guard, a sanitary napkin or a panty guard, comprising an absorbent pad which is embraced between a liquid-permeable upper, or inner casing layer which is intended to face towards the wearer in use, and an outer casing layer, or backing layer, which is intended to lie distal from the wearer in use, and further comprising elastication.

The absorbent pads of such absorbent articles are intended to take-up body fluids discharged by the wearer. One problem with earlier known absorbent articles, such as diapers, is that large quantities of fluids are discharged over very short periods of time and that these large fluid quantities are unable to penetrate the liquid-permeable casing layer quickly enough. Another problem is that excrement is often not able to penetrate through the casing layer at all, unless special measures are taken to this effect. As a result, excrement, and at times also urine, remains in a receiving zone on top of the diaper, between the inner casing layer and the user, which can naturally lead to a number of problems and cause discomfort to the wearer. This liquid and excrement, particularly loose excrement, will float uncontrollably on top of the inner casing layer and travel along the simplest route under the influence of gravity, and sooner or later the liquid or the loose excrement will run out over the edges of the diaper, therewith soiling the clothes or bed linen of the wearer, to the great disadvantage of both the wearer, parents or nursing personnel. The liquid and/or excrement is able to escape at the end-edges and side-edges of the diaper,

depending on the position of the wearer's body at the time, although such leakage, or seepage, will take place primarily at the side-edges of the diaper. That part of the diaper which lies between the wearer's  
5 thighs, the so-called crotch part, is particularly restricted laterally, and consequently the urine and excrement has only a very short distance to travel to the side-edges of the diaper. It will be understood that the risk of leakage from the diaper edges is  
10 particularly great when the wearer lies on his/her side and large quantities of urine or loose excrement are discharged suddenly. Edge-leakage is also a problem in articles which are intended to absorb menstruation fluid, such as sanitary napkins, since such  
15 articles are very narrow, so that they can be worn discretely and comfortably. It is known to guard against discomfort caused by this type of edge-leakage, by mounting elongated elastic devices, in the form of elastic threads, bands or the like, in readily  
20 flexible side flaps provided externally of the side-edges of the absorbent pad, so that the side flaps will conform sealingly to the wearer's thighs. See for instance Swedish Patent Specification 7905765-9 and European Patent Application EP 0 091 412. The side  
25 flaps are often comprised of parts of the casing layer and extend, at least laterally, beyond the edges of the absorbent pad, where they are mutually joined.

It is also known from British Patent Specification  
30 2,161,059 A to arrange narrow folds in the inner casing layer nearest the wearer. The folds are formed in the casing layer and depart from a longitudinally extending base line, wherein the mutually opposing side-walls of the fold are mutually joined along the  
35 full length of the fold. Mounted within the fold are elastic devices which are intended to elevate the folds, up and away from the surface of the casing



layer. The two end-parts of the fold, at respective end-parts of the diaper, are folded laterally inwards towards the centre of the diaper and there secured to the casing layer.

5

EP O 311 333 A2 teaches a "floating" region of a casing layer at respective side-edges of a diaper, this region being delimited laterally by two joins, an outer and an inner join, between which the casing layer is unattached to the material located beneath the casing layer. These joins are mutually spaced, so that the "floating" region will have a given width. Disposed in this "floating" region is an elastic device whose ends are attached to the casing layer, while the intermediate part of said device is free from at least the underlying layer, thereby enabling the elastic device to "float" freely in said "floating" region and, at the same time, lift the casing layer within said region.

20

GB 2,216,393 A teaches a diaper which has barrier flaps that extend along the side-edges of the diaper. The barrier flaps have a main part which extends up from the diaper, an inner crotch part which extends from said main part in towards the diaper, and an outer crotch part which extends from said main part away from the diaper. Both of the crotch parts include elastic elements which ensure that said parts will seal elastically against the wearer. In the case of the illustrated embodiment, the main part of the barrier flaps is comprised of at least two mutually abutting layers. Each of the crotch parts branches in a respective direction at the uppermost part of the main barrier part, therewith imparting a T-shape or Y-shape to the barrier flaps. It is intended that the elastics shall lie against the inside of the wearer's thighs instead of chaffing the wearer's crotch.

35

These narrow folds, or "floating" regions of the casing layer are, however, encumbered with drawbacks. For instance, a narrow fold configured in accordance with GB 2,161,059 can be readily deflected laterally and flattened against the casing layer, so that the fold will no longer assist in protecting against leakage, therewith allowing liquid to run over the flattened fold. Because the two end-parts of the fold are folded laterally and inwardly, the elastic elements will always be located laterally inwards of the base line of the fold, therewith impairing the elastic sealing effect of the fold. In practice, the tension required in the elastic elements to enable said elements to raise the fold vertically from its position on one side of the base line is so great as to render it particularly uncomfortable to the wearer. On the other hand, less tension or stretch in the elastic elements would result in a significant risk of gaps appearing between the folds and the wearer's skin, since the tension would not then be sufficient to lift the fold from its horizontal starting position. The space between the folds is also limited, because the folds are both oriented in a direction inwardly of the diaper, thereby enabling urine or excrement to collect outside the folds instead of inwardly thereof. For reasons of a trigonometrical nature, the "floating" region where the joins are spaced from one another, as described in EP 0 311 333, does not obtain a sufficiently high height and does not therefore provide a sufficiently effective barrier against leakage within the crotch area, where the risk of leakage is particularly great and where the highest possible and most stable leakage barrier is desired.

Thus, there is a need for improved protection against edge leakage in absorbent articles such as diapers, incontinence guards and sanitary napkins.

In accordance with the invention, an absorbent article of the kind defined in the introduction is characterized in that the article includes on both sides of a central receiving zone, a hose-like fold which is comprised of a pliable or flexible material layer which extends in the longitudinal direction of the article on that side thereof which is intended to face the wearer in use, such as to form leakage barriers; in that the, or each fold has a first and a second end-part and an intermediate part, two first fold lines from which the fold departs and which extend in the longitudinal direction of said fold, said first fold lines being close to one another and coinciding essentially with a common base line; in that the fold extends laterally outwards away from the base line in both directions; in that two elastic elements, such as elastic threads, bands or the like, are mounted within the hose-like fold in a pre-stretched state and along said fold, one element on each side of the base line; in that the two end-parts of the fold are planar and have a maximum lateral extension and are terminated at second fold lines on each side of said base line, wherein respective elastic elements extend along said second fold lines; in that said end-parts of the fold are joined to the liquid-permeable upper casing layer in a flat, permanently down-pressed state; in that the elastic elements are joined to the fold along said second fold lines at the end-parts of the fold; in that the inter-mediate part of the fold and the elastic elements extending therethrough are freely moveable whereby in the extended, flat state of the article, the hose-like fold is flat, including also the intermediate part of said fold, with each of the two elastic elements located on a respective side of the base line, and whereby, when the article is placed on the user and therewith forcibly curved to conform to the wearer's body, the intermediate part of the fold

will lift vertically as a result of the action of the elastic elements, so as to form said leakage barriers.

5 In another embodiment of the invention, the hose-like folds are disposed in the transverse direction of the article, preferably close to respective end-edges of the article.

10 In one preferred embodiment of the invention, two elastic elements are mounted within a longitudinally extending fold in mutually spaced relationship, wherein the distance between said elements is equal to the width of the fold at its respective end-part. The elastic elements are attached to the pliable material layer at respective end-parts of the fold, these end-  
15 parts, in turn, being attached to the casing layer so as to maintain the spacing of said elements at their respective end parts. When the diaper is curved in use to a generally U-shape, as seen from one side of the  
20 diaper, the elastic elements will successively approach one another in a direction from respective end-parts to a region approximately central between the end-parts, where the elastic elements may even coincide. The fold also narrows successively in the same  
25 direction, while, at the same time, progressively lifting vertically, away from the surface of the casing layer, and has its narrowest and its highest part in the same region, approximately centrally of the end-parts, as those regions in which the elastic  
30 elements lie closest together or coincide. Thus, the fold has its greatest height approximately centrally of its two end-parts, which in the case of a fold disposed along the side-edges of the diaper lies in the crotch part of the diaper where the need for the  
35 highest possible barrier is at greatest. This height is essentially equal to the width of the end-parts of the fold where the elastic elements coincide. The high

narrow fold widens successively from this region towards the end-parts of the fold, since the elastic elements strive to separate laterally, one from the other, while the height of the fold decreases successively at the same time. Because the end-parts of the elastic elements are attached at some considerable distance apart and on respective sides of the base line, the fold will obtain considerable resistance to lateral deformation. One important advantage afforded by the inventive construction is that the barrier will lift vertically along substantially the whole of its length as the article is curved while fitting the same to the wearer, which is not always the case with earlier known constructions. Another advantage is that because the fold is relatively wide over a comparatively large part of its length, the fold will lie softly and comfortably against the skin of the wearer. The use of more than one elastic element also enables the elements to be tensioned to a lesser extent than when only one element is used, which is beneficial from the aspect of wearer comfort. It will be understood that more than two elastic elements can be mounted within the tunnel fold, wherein the distance between the two outermost elements is equal to the width of the fold at the end-part thereof. The provision of several elastic elements also greatly increases the degree of wearer comfort.

An essential feature of the invention is that the side-walls of the fold are not connected with one another and that the elastic elements are solely connected to the end-parts of the fold and to no other part thereof. One reason for this is that binding agents tend to impart stiffness and hardness to the fold and therewith possibly causing discomfort to the wearer. In unfavourable cases, the binder may also penetrate the fold material and bond the fold to the

casing layer, thereby preventing the fold from lifting in the manner intended.

5 Another reason is because an "airy" fold and a fold that can breathe is desired, so as to enhance wearer comfort. The presence of an air-filled tunnel between the inner and the outer side-walls of the fold enables the outer side-wall to function as a leakage barrier independently of the inner side-wall. Thus, liquid is  
10 forced to pass the inner side-wall and the corridor between said side-walls before reaching the outer side-wall.

15 The end-parts of the fold extend laterally both inwardly of and outwardly of the base line, and one elastic element is attached outwardly of the base line and the other element inwardly thereof. By arranging parts of the fold and an inner elastic element inwardly of the base line at the front and the rear parts of  
20 the article, there is obtained in the intermediate part of the fold a kind of collecting pocket or channel between the casing layer and the inner side-wall of the fold. This pocket is oriented inwardly of the diaper and extends in the longitudinal direction of  
25 the fold, to the region located generally centrally between the end-parts of the fold, where the fold is narrowest and highest.

30 Furthermore, advantages are obtained by disposing parts of the fold and an outer elastic element outwardly of the base line at the front and the rear parts of the article respectively. For instance, the distance between the folds arranged at respective side-edges of the article is larger than when the  
35 whole of the fold extends inwardly of the base line. This latter case would greatly restrict the urine-receiving and excrement-receiving surface between the

two folds. In this context, the outer elastic element functions as a counterbalance to the inner elastic element, which strives to move the fold inwardly of the article from its attachment part inwardly of the base line, whereas the outer elastic element strives to move the fold in the opposite direction from its attachment part outwardly of the base line. Thus, the two elastic elements coact to give the fold its shape, which varies from a wide, low fold at the front and the rear parts of the article to a successively narrower and higher fold, the closer the fold approaches the centre point between the two end-parts of the fold. Seen from above, the fold describes a longitudinally extended X, i.e. the side-edges of the fold are arcuate and curve in opposite directions towards each other.

When the two attachment parts of the two elastic elements are spaced equidistant from the common base line at the end-parts of the fold and on opposite sides of the base line, the elastic sealing effect of the fold against the skin of the wearer will act in a vertical direction relative to the plane of the casing layer and immediately above the common base line, where the fold has a zero angle of inclination. As a result, the fold will move resiliently vertically up or down, depending on whether the wearer increases or decreases the pressure exerted on the fold. When the wearer causes the pressure on the fold to increase, the fold will be compressed slightly while widening at the same time, such as to obtain a generally triangular shape, with the base of the triangle facing upwards. The fold is therefore not deformed in any disadvantageous manner, and contact with the wearer's skin will be maintained during this downward movement of the fold. When the pressure exerted by the wearer decreases, the fold moves resiliently upwards while narrowing at the

same time and therewith increasing the height of the fold, so as to maintain abutment with the skin and also fulfilling its function as a leakage barrier.

5        Although it is preferred to attach equally large end-  
parts of the fold both inwardly and outwardly of the  
common base line, so as to be able to obtain a maximum  
fold height and a favourable resilient sealing effect  
10       immediately above the common base line, it is conceiv-  
able to displace the end-parts of the fold laterally  
in relation to the base line. In the case of folds  
which are disposed along the end-edges of an article,  
it may be beneficial, for instance, when greater parts  
of the fold extend inwardly of the base line than  
15       outwardly thereof, so as to obtain the largest possi-  
ble pocket. The requirement of sufficient distance  
between the folds is, after all, satisfied in that  
articles such as diapers are often elongated and in  
that the end-edges of the article are therewith locat-  
20       ed at a safe distance from one another. In the case of  
articles in which the folds are provided along the  
side-edges thereof, it may be advantageous, for in-  
stance, to permit the end-part of the fold in the  
front part of the article to extend laterally with  
25       parts of different sizes inwardly and outwardly of the  
base line, i.e. to permit different sized parts of the  
inner side-wall and of the outer side-wall to be  
attached to the casing layer, while in the rear part  
of the article permitting larger parts of the fold to  
30       extend outwardly of the base line than inwardly there-  
of, so as to create the widest possible space between  
the folds at said rear part of the article.

35       Because the fold has a hose-like form and because the  
intermediate part of the elastic elements located  
between the points at which the element is attached to  
respective end parts of the fold is able to move



freely both laterally and vertically, the fold can be oriented in a direction suitable for the purpose intended, by displacing the fold in relation to the common base line when fastening the end-part of the fold to the casing layer, without needing to change the width of the fold to any appreciable extent or to allow the base line to describe a non-linear curve. For instance, there may be provided a base line which extends totally in the longitudinal direction of the article, while displacing the end-parts of the fold laterally to an appropriate extent and still obtain a fold which extends obliquely in relation to the longitudinal axis of the article, without needing to encroach on the width of the fold at said parts. This will afford a high degree of flexibility in manufacture, since articles such as diapers are produced in a large number of sizes and shapes, all of which require their particular variant of the pattern formed by two folds, for instance along respective side-edges of the diaper, in order for the diapers to function effectively, both with regard to body conformity and proof against leakage. With regard to manufacture, an advantage is gained when a linear base line extends parallel with the longitudinal axis or transverse axis of the article, this arrangement being preferred, although not necessary, since the articles are produced at a very high rate of manufacture and process steps which are performed parallel with the direction of the manufacturing line are often the most suitable from a process/technical aspect. It will be understood, however, that in spite of this, it is conceivable in some instances for the base line to be angled slightly in relation to the longitudinal or transversal axis of the article, when considered appropriate. It will be also understood that inventive longitudinally and transversely extending folds can be combined, therewith providing around all edges of the

article barriers which fully circumvent the liquid-and-excrement-receiving area inwardly of the folds.

5 An absorbent article construction in accordance with the invention will now be described with reference to an exemplifying embodiment thereof illustrated in the accompanying drawings, in which

10 Figure 1 illustrates a diaper from above and from that side which is intended to face towards the wearer in use, and shows the elastic elements in a stretched state; parts of one fold have been omitted from the illustration for the sake of clarity;

15 Figure 2 is a cross-sectional view of the diaper shown in Figure 1, taken on the line II-II;

20 Figure 3 is a cross-sectional view of the diaper shown in Figure 1, taken on the line III-III;

Figure 4 is a cross-sectional view of the diaper shown in Figure 1, taken on the line IV-IV;

25 Figure 5 is a cross-sectional view of the diaper shown in Figure 1, taken on the line III-III, but with the elastic elements shown contracted from their stretched state;

30 Figure 6 is a perspective view of a diaper with the elastic elements contracted from their stretched state;

35 Figure 7 shows a sanitary napkin from above, with the elastic elements in a stretched state, said view being taken from the side which is intended to face towards the wearer in use;

Figure 8 is a perspective view of part of the napkin shown in Figure 7, illustrating a section of a fold in which the elastic elements have contracted from their stretched state; and

5

Figure 9 illustrates from above a diaper according to another embodiment, with the elastic elements in a stretched state, said view being taken from the side which is intended to face towards the wearer in use.

10

The diaper illustrated in Figure 1 includes a liquid-permeable casing layer 1, a liquid-impermeable casing layer 2 and an absorbent pad 3 placed between said layers 1 and 2. The liquid-permeable casing layer 1 is placed on that side of the diaper which is distal from the wearer in use and is comprised, for instance, of a pliable, non-woven fabric. The liquid-impermeable layer 2 is placed on the opposite side of the diaper and is comprised, for instance, of a polyethylene sheet. The absorbent pad comprises, for instance, cellulose fluff fibres or other absorbent fibres. The absorbent pad may also include so-called super-absorbents, i.e. substances whose absorbency is many times that of the substances' own weight. The super-absorbents may be comprised of polymers, such as cross-linked polyacrylates, and may be present in the form of flakes, granules, powder or fibres. The super-absorbents and the cellulose fluff fibres may be mixed together in the absorbent pad in a greater or lesser homogenous state, or the superabsorbents may, alternatively, be arranged in layers in the absorbent pad. The absorbent pad may be constructed of one or more absorbent layers which vary individually with regard to material composition, size, density, surface weight, etc. For the sake of simplicity, the absorbent pad 3 of the illustrated embodiment is shown as one single layer.

15

20

25

30

35

5 The illustrated diaper has two side-edges 4, 5, two end-edges 6, 7, a front part 8 which is intended to lie forwardly of the wearer in use, a back part 9 which is intended to be located rearwardly on the wearer in use, and a crotch part 10 located between the front and the back parts 8, 9 of the diaper. Both the diaper and the absorbent pad 3 have a modified T-shape, with the transverse limb of the T being located in the front part 8 of the diaper.

10 The two casing layers 1, 2 extend laterally beyond the side-edges 11, 12 of the absorbent pad, where they are joined together to form side flaps 13, 14. The two casing layers 1, 2 are joined together at the end-edges 6, 7 of the diaper without forming a corresponding end flap, by folding the liquid-impermeable layer 2 around the end-edges 15, 16 of the absorbent pad 3 and slightly in over said pad and in beneath the liquid-permeable casing layer 1, in a manner not shown. The two casing layers 1, 2 are joined together in a conventional manner, for instance with the aid of an adhesive, or by heat-sealing or ultrasonic welding processes.

25 Elastic elements in the form of two pre-stretched elastic threads 17 are provided in respective side flaps 13, 14 extending from the back part 9 to the front part 8 of the diaper. Elastic bands, foamed material, film and like material may conceivably be used instead of elastic threads. The elastic threads 17 extend in over the absorbent pad 3 at the front part 8 of the diaper, therewith departing from the side flaps 13, 14. The elastic threads 17 in the two side flaps 13, 14 together form a V-shaped pattern, with the apex of the V located on the front part 8 of the diaper.

A pair of fastener tabs 18, 19 are provided on respective side-edges 4, 5 of the back diaper part 9 in a conventional manner, these fastener tabs enabling the back diaper part 9 to be fastened to the front diaper part 8 after the diaper has been placed on the wearer.

Two folds 20, 21 in the liquid-permeable casing layer 1 are arranged along the side-edges 4, 5 of the diaper. The folds have a hose-like or tubular configuration, and each has an inner side-wall 22 and an outer side-wall 23. The inner side-wall 22 faces in towards the diaper and the outer side-wall 23 faces out away from the diaper in the raised or elevated state of the fold, as will best be seen from Figure 5.

Each inner and outer side-wall 22, 23 departs from a respective fold line 24, 25 in the liquid-permeable casing layer 1, these fold lines 24, 25 being placed so close together as to essentially coincide to form a longitudinally extending base line 26 which is common to the fold 20, 21. This common base line 26 is located inwardly of respective side-edges 11, 12 of the absorbent pad and extends in a generally straight line from one end-edge 6 of the diaper to the other end-edge 7 thereof.

The fold 20, 21 also has two end-parts 27, 28 and an intermediate part 29. The width of the fold 20, 21 is essentially equally as large at the end-parts 27, 28 and the intermediate part 29. The two end-parts 27, 28 are attached to the liquid-permeable casing layer 1 in lateral attachment regions 30, 31 both inwardly and outwardly of the common base line 26, and are delimited laterally by respective second fold lines 36, 37. The end-parts of the fold may be bonded to the casing layer with the aid of an adhesive, or attached thereto by ultrasonic welding, heat-sealing or some other

process suitable for the purpose intended.

Since the fold 20, 21 has the same width over the whole of its length and the common base line 26 extends in the direction of the long axis of the diaper, parts of the inner side-wall 22 and the outer side-wall 23 of the fold will be attached to the casing layer 1, the inner side-wall 22 being attached inwardly of the common base line 26 in attachment regions 30 and the outer side-wall 23 being attached outwardly of the common base line 26 in attachment regions 31. The fold 20, 21 is displaced laterally, so that those fold parts which are attached outwardly of the common base line 26 will be generally the same size as those parts which are attached inwardly of said common base line. However, for reasons of a process/technical nature, it is conceivable for the width of the fold 20, 21 at the end-parts 27, 28 to be somewhat smaller when joining the end-parts 27, 28 to the liquid-permeable casing layer 1, for instance due to unintentional crumpling or creasing of the fold side-walls.

Two elastic elements 32, 33, for instance in the form of pre-stretched elastic threads, bands or the like, are mounted within the fold 20, 21. The elastic elements 32, 33 are attached to the end-parts 27, 28 of the fold 20, 21, for instance with the aid of an adhesive, but are free to move in relation to the fold 20, 21 and in relation to each other in the intermediate part 29 of the fold. Neither are the inner and the outer side-walls 22, 23 joined together at this intermediate part 29 of the fold. The elastic elements 32, 33 within the fold 20, 21 are also spaced apart at a distance which is equal to the width of the end-part 27, 28 of the fold, i.e. at respective second fold lines 36, 37. When the diaper is extended, i.e. in the manner shown in Figure 1, the elastic elements 32, 33

extend parallel with one another along respective second fold lines 36, 37 along the full length of respective folds 20, 21. The greater the distance between the elastic elements 32, 33 at the end-parts 27, 28 of the fold, the farther the elastic elements 32, 33 are spaced from one another along the fold 20, 21 before said elements 32, 33 merge with one another and raise the fold 20, 21 to its maximum height in the crotch part 10 of the diaper when curving the diaper in order to place it around the wearer's body. This enables the fold to be stretched so as to exhibit width and stability in the front part and back part 8, 9 of the diaper. It is conceivable, of course, that because of process/technical reasons, the elastic elements 32, 33 will not be positioned exactly at the maximum distance afforded by the width of the fold, although deviations of one or two millimeters can be considered immaterial, since the fold has a width of at least two centimeters. The most important criterion is that the elastic elements are spaced at the greatest possible distance from one another.

Figures 2-4 are cross-sectional views of the diaper shown in Figure 1 at three different positions, i.e. in the front part 8, the crotch part 10 and the back part 9 of the diaper respectively. The illustrated size ratios between the different widths, lengths and thicknesses of the illustrated structural elements may appear to be disproportionate in several instances. This is because these parameters have been either enlarged or reduced for the sake of clarity.

Figure 2 illustrates how the two folds 20, 21 are fastened to the liquid-impermeable casing layer 1 relative to the common base line 26 in respective fastening regions 30, 31. Figure 2 also shows the positioning of the elastic elements 32, 33 within

5 respective end-parts 27 of the fold. The elastic  
 elements 17 extend along the side-edges of the diaper  
 and are attached inwardly of respective side-edges 11,  
 12 of the absorbent pad in the front part 8, between  
 said pad and the liquid-permeable casing layer 1. The  
 elastic element 17 extend from the front part 8 of the  
 diaper in a direction towards the back part 9 thereof  
 and parallel with the obliquely cut parts of the  
 10 diaper side-edges 4, 5 in the crotch part 10, wherein  
 the elastic element 17 from the crotch part 10 and  
 rearwards are attached in the side flaps 13, 14, as  
 illustrated in Figures 3 and 4. It will also be seen  
 from Figure 3 that when the elastic elements 17, 32,  
 33 are stretched, the folds 20, 21 will extend slight-  
 15 ly outside respective side edges 11, 12 of the absor-  
 bent pad, since the crotch part 10 of the pad 3 is  
 narrower at the crotch part 10 than at the front and  
 back parts 8, 9 of the diaper. Figure 4 shows that, in  
 principle, the two folds 20, 21 are fastened at the  
 20 back part 9 in the same manner as at the front part 8.  
 Figure 4 also shows fastener tabs 18, 19 attached to  
 the outer surface of the liquid-impermeable backing  
 layer 2, in a Z-folded configuration.

25 When the elastic elements 17, 32, 33 contract from  
 their stretched state, the two folds 20, 21 of the  
 diaper will lift in the crotch part 10, as shown in  
 Figure 5. The section shown in Figure 5 is taken at  
 the same place as the section shown in Figure 3.  
 30 Figure 5 shows that in this state of the diaper, the  
 two elastic elements 32, 33 have moved together, so as  
 not to be spaced apart in this region of the diaper  
 and at that moment in time. Contraction of the elastic  
 element 17 also causes the side flaps 13, 14 to be  
 35 curved upwards, as will also be seen from Figure 5.

Figure 6 is a perspective view of an inventive diaper.



The manner in which the end-parts 27, 28 of the folds are attached differs in the case of the diaper according to the Figure 6 embodiment, although in other respects the diaper is identical to the diaper shown in Figure 1.

Figure 6 shows how the folds 20, 21 narrow down from their respective end-parts 27, 28 in a direction towards the intermediate part 29, while rising vertically above the common base line 26 at the same time. A tape 34, 35 is placed along the respective end-edges 6, 7 of the diaper, over the liquid-permeable casing sheet 1 and over respective end-parts 27, 28 of the folds. The tape 34, 35 functions to hold the end-parts 27, 28 of the folds in a flattened and extended state against the casing layer 1.

Figures 7-8 illustrate a sanitary napkin constructed in accordance with the invention. The illustrated sanitary napkin includes a liquid-permeable casing layer 101, a liquid-impermeable casing layer or back-sheet 102, and an absorbent pad 103 placed between the two casing layers 101, 102. The liquid-permeable casing layer 101 is placed on that side of the napkin which is intended to face towards the wearer in use and is comprised, for instance, of a non-woven fabric or a perforated plastic film. The liquid-impermeable layer 102 is comprised, for instance, of a plastic film or a non-woven fabric which has been made hydrophobic. The absorbent pad 103 may comprise one or more layers of absorbent material, for instance cellulose fluff with or without admixture with superabsorbents. In Figure 8, the absorbent pad 103 is shown to comprise only one single layer.

The illustrated napkin has two side edges 104, 105 and two end-edges 106, 107. The two casing layers 101, 102

extend beyond the edges 111-112, 115-116 of the absorbent pad and are there joined together and form side flaps 113, 114. The casing layers 101, 102 are conveniently joined together with the aid of some known technique, for instance as by gluing, heat-welding or ultrasonic welding. The liquid-permeable casing layer 101 has two folds 120, 121 which extend along the side edges 104, 105 of the napkin. These folds are shown in a flat, extended state in Figure 7. As will best be seen from Figure 8, the folds have a tubular or hose-like configuration and when raised present an inner side-wall 122 and an outer side-wall 123. The inner side-wall 122 faces in towards the napkin and the outer side-wall 123 faces outwardly of the napkin.

Each of the inner and outer side-walls 122, 123 extends from a respective fold line 124, 125 on the liquid-impermeable casing layer 101, these fold lines 124, 125 being located so close together as to essentially coincide to form a common, longitudinally extending fold base line 126. The common base line 126 is arranged inwardly of respective side-edges 111, 112 of the absorbent pad and extends in an essentially straight line, from one end-edge 106 of the napkin to the other end-edge 107.

The fold 120, 121 also has two end-parts 127, 128 and an intermediate part 129, and has essentially the same width at both end-parts 127, 128, and in the intermediate part 129. The two end-parts 127, 128 are attached to the liquid-permeable casing layer 101 in lateral attachment regions 130, 131 both inwardly and outwardly of the common base line 126 and are flattened against the casing layer 101 at said end-parts 127, 128, such as to define the fold laterally by respective second fold lines 136, 137. The end-parts of the fold can be secured, for instance, with the aid

of an adhesive, or by an ultrasonic welding process, a heat-sealing process or by some other process suitable to this end.

5 Since the fold 120, 121 has the same width over the whole of its length and since the common base line 126 extends in the longitudinal direction of the napkin, parts of the inner side-wall 122 and of the outer side-wall 123 will be fastened to the casing layer  
10 101, the inner side-walls 122 in the attachment regions 130 inwardly of the common base line 126 and the outer side-wall 123 in the attachment regions 131 outwardly of the common base line 126. The fold 120, 121 is displaced laterally, so that those parts of the  
15 fold 120, 121 which are secured outwardly of the common base line 126 will be roughly the same size as those fold parts which are secured inwardly of the common base line 126.

20 Two elastic elements 132, 133, for instance pre-stretched elastic threads, bands or the like, are mounted within the fold 120, 121 in the same manner as that described with reference to the diaper illustrated in Figures 1-6.

25 Figure 8 shows that the elastic elements 132, 133 approach each other within the fold 121, so as to coincide in a region of the intermediate fold part 129. The fold is wide and low at its end-part 127, but  
30 rises and tapers off in a direction towards the intermediate part 129. The fold 121 therewith forms a high, stable, comfortable and resilient sealing barrier which effectively counteracts leakage of menstruation fluid over the side- edges of the napkin.

35 Figure 9 illustrates an embodiment of the invention in which the hose-like folds 20', 21' are arranged in the

transverse direction of a diaper instead of in its longitudinal direction. The diaper shown in Figure 9 and the folds 20', 21' are otherwise similar to the diaper and folds shown in Figure 1. The fastener tabs shown on the diaper of the Figure 1 embodiment and used to secure the diaper to the wearer are not shown in Figure 9. It will be understood, however, that the diaper shown in Figure 9 may also be provided with such fastener tabs, conveniently attached at the same positions as the fastener tabs on the diaper shown in Figure 1.

The hose-like folds 20', 21' in Figure 9 are identical with the folds 20, 21 shown in Figure 1, and consequently corresponding structural elements have been identified by the same reference numeral but with the addition of an apostrophe. The hose-like folds 20', 21' of the Figure 9 embodiment are disposed along respective end-edges 6, 7 of the diaper. The folds 20', 21' are, in other respects, configured in precisely the same manner as the earlier described longitudinally extending folds 20, 21. When the diaper is fitted to a wearer, the end-edges of the diaper are curved around the stomach and the backside of the wearer, wherewith the transverse folds 20', 21' will rise from their flattened, extended state, in the same way as the longitudinally extending folds 20, 21, to form a barrier against leakage along the end-edges of the diaper. This diaper construction also provides a leakage barrier which seals resiliently against the body of the wearer in a vertical direction relative to the plane of the casing layer 1 and in the end-parts 27', 28' of the fold, because the elastic elements 32', 33' are uniformly spaced laterally from the common base line 26' of the fold.

The invention shall not be considered to be restricted

to the illustrated and described embodiments, since a number of variations are conceivable within the scope of the following Claims. For instance, the article may include a casing layer which is additional to the  
5 illustrated casing layers, such as a second liquid-permeable casing layer placed between the absorbent pad and that casing layer from which the fold is formed. Parts of this additional casing layer may also be included in the folds created, so as to provide a  
10 fold having double inner and double outer side-walls.

The variant in which two liquid-permeable casing layers are provided is particularly suitable when the folds in the longitudinal direction shall not extend  
15 over the whole of the article. In this case, the double casing layer is used solely in the crotch part, where it is most useful, and the end-parts of the folds are fastened to the front and back part of the article in spaced relationship with the corresponding  
20 end-edges thereof.

Instead of forming folds in the liquid-permeable casing layer, it is, of course, conceivable to instead form the folds in separate material layers which are  
25 placed on top of the casing layer of the article and which have no appreciable lateral extension beyond the fold lines, or at least do not extend right out to the side edges of the article. These separate material layers may either form one single discrete fold of  
30 limited extension also inwardly of the fold lines, or form two mutually spaced folds at respective side edges of the layer.

It is also possible to place the common base line of  
35 the fold outwardly of the side-edge or end-edge of the absorbent pad, over the full length of the fold or over parts thereof.

Claims

1. An absorbent article, such as a diaper, an incontinence guard, a sanitary napkin or a panties protector intended for one-time use only and comprising an absorbent pad (3) which is sandwiched between a  
5 liquid-permeable upper casing layer (1) which is intended to face towards the wearer in use, and a lower casing layer (2) which is intended to lie distal from the wearer in use, and further comprising elastic elements (32, 33), c h a r a c t e r i z e d in that  
10 arranged on both sides of a central receiving zone, is a hose-like fold (20, 21) which is comprised of a pliable or flexible material layer which extends in the longitudinal direction of the article on that side thereof which is intended to face the wearer in use,  
15 such as to form leakage barriers; in that the, or each fold has a first and a second end-part (27, 28) and an intermediate part (29), two first fold lines (24, 25) from which the fold (20,21) departs and which extend in the longitudinal direction of said fold, said first  
20 fold lines (24, 25) being close to one another and coinciding essentially to form a common base line (26); in that the fold (20,21) extends laterally outwards away from the base line (2) in both directions; in that two elastic elements (32, 33), such as  
25 elastic threads, bands or the like, are mounted within the hose-like fold (20, 21) in a pre-stretched state and along said fold, one element on each side of the base line (26); in that the two end-parts (27, 28) of the fold (20, 21) are planar and have a maximum  
30 extension in the lateral direction and are terminated at second fold lines (36, 37) on each side of said base line (26), wherein respective elastic elements (32, 33) extend along said second fold lines (36, 37); in that said end-parts (27, 28) of the fold (20, 21)  
35 are joined to the liquid-permeable upper casing layer

(1) in a flat, permanently down-pressed state; in that the elastic elements (32, 33) are joined to the fold (20,21) along said second fold lines (36, 37) at the end-parts (27, 28) of the fold; in that the intermediate part (29) of the fold (20, 21) and the elastic elements (32, 33) extending therethrough are freely moveable, whereby in the extended, flat state of the article , the hose-like fold (20, 21) is flat, including also the intermediate part (29) of said fold, with each of the two elastic elements (32, 33) located on a respective side of the base line (26), and whereby, when the article is placed on the user and therewith forcibly curved to conform to the wearer's body, the intermediate part (29) of the fold (20, 21) will lift vertically as a result of the action of the elastic elements (32, 33), so as to form said leakage barriers.

2. An article according to Claim 1, c h a r a c -  
t e r i z e d in that the base line (26) of the fold (21, 21) is located inwardly of respective side edges (11, 12) of the absorbent pad.

3. An article according to any one of the preceding Claims, c h a r a c t e r i z e d in that the fold extends laterally equidistant from the base line (26) in both directions, at least at one end-part (27, 28) of the fold.

4. An article according to any one of Claims 1-2 c h a r a c t e r i z e d in that the fold (20, 21) extends laterally to different extents in respective directions from the base line (26), at least at one end-part (27, 28) of the fold.

5. An article according to any one of the preceding Claims, c h a r a c t e r i z e d in that the fold

(20, 21) is formed by a fold in the upper liquid-impermeable upper casing layer (1).

5        6.    An article according to Claim 5, c h a r a c -  
t e r i z e d    in that a separate material layer is  
placed beneath the fold (20, 21) and joined thereto on  
both sides of the base line (26) with the intention of  
strengthening the fold (20, 21).

10       7.    An article according to any one of Claims 1-4,  
c h a r a c t e r i z e d    in that the fold (20, 21)  
is formed by a separate layer placed on the liquid-  
permeable upper casing layer (1).

15       8.    An article according to any one of the preceding  
Claims, c h a r a c t e r i z e d    in that the fold  
is formed in a liquid-permeable casing layer which is  
placed on the upper casing layer and the end-edges of  
20       which are spaced from the corresponding end-edge of  
the article.

25       9.    An article according to any one of the preceding  
Claims, c h a r a c t e r i z e d    in that the arti-  
cle is a diaper and includes elastic elements (17)  
placed inside flaps (13, 14) which include parts of  
the upper and the lower casing layers (1, 2) and which  
extend laterally beyond the side edges (11, 12) of the  
absorbent pad; and in that the elastic elements (17)  
30       mounted in said side flaps (13, 14) function as leg  
elastication when the article is in use.

35       10.   An absorbent article intended for one-time use  
only, such as a diaper, an incontinence guard or the  
like, comprising an absorbent pad (3) which is sand-  
wiched between a liquid-permeable upper casing layer  
(1), intended to face towards the wearer in use, and a



lower casing layer (2) intended to lie distal from the wearer in use, two side-edges (4, 5) and two end-edges (6, 7), a front part (8) intended to lie forwardly of the wearer in use, a back part (9) intended to lie rearwardly of the wearer in use, and a crotch part (10) located between said front and said back part (8, 9), and further including elastic elements (32', 33'), characterized in that a hose-like fold (20', 21') comprised of a pliable or flexible material layer is arranged in the transverse direction of the article on the side thereof which faces the wearer in use and on both sides of a central receiving zone such as to form leakage barriers, in that the fold (20', 21') has a first and a second end-part (27', 28') and an intermediate part (29'), two fold lines which extend in the longitudinal direction of the fold (20', 21') and from which said fold (20', 21') departs, said fold lines being located close together and essentially coinciding to form a common base line (26'); in that the fold (20', 21') extends laterally outwards in both directions from the base line (26'); in that two pre-stretched elastic elements (32', 33'), such as elastic threads, bands or the like, are mounted within the hose-like fold (20', 21') and extend along said fold, one on each respective side of the base line (26'); in that the two end-parts (27', 28') of the fold (20', 21') are flat with maximum extension laterally and are terminated in second fold lines (36', 37') on each side of said base line (26'), wherein respective elastic elements (32', 33') extend along said second fold lines (36', 37'); in that the end-parts (27', 28') of the fold (20', 21') are joined to the liquid-permeable upper casing layer (1) in a flat, permanently down-pressed state; and in that the intermediate fold part (29') and the elastic elements (32', 33') extending therethrough are freely moveable, whereby the hose-like folds (20', 21') in the extended

flat state of the article are flat also in the intermediate part (29') and have the two elastic elements (32', 33') positioned on both sides of the base line (26'), and whereby the intermediate fold part (29') is forcibly lifted vertically as the article is fitted to the wearer with subsequent curving of said article, as a result of the action of the elastic elements (32', 33'), thereby forming said leakage barriers.

11. An article according to Claim 10, characterized in that the hose-like fold (20', 21') is located close to a respective end-edge (6, 7) of said article.

12. An article according to any one of Claims 10-11, characterized in that the fold (20', 21') extends laterally to different extents in respective directions from the base line (26') at the end-parts (27', 28') of the fold.

13. An article according to any one of Claims 10-11, characterized in that the fold (20', 21') extends laterally equidistant in both directions from the base line (26') at the end-parts (27', 28') of said fold.

14. An article according to any one of Claims 10-13, characterized in that the fold (20', 21') is formed by a fold in the liquid-permeable casing layer (1).

15. An article according to Claim 14, characterized by a separate material layer which is placed beneath the fold (20', 21') and joined to said fold on both sides of the base line (26'), so as to strengthen the fold (20', 21').

16. An article according to any one of Claims 10-13, characterized in that the fold (20', 21') is formed by a separate layer placed on the liquid-permeable upper casing layer (1).

5

17. An article according to Claim 1 and Claim 10, characterized in that hose-like folds (20, 20', 21, 21') are arranged in both the longitudinal direction and the transverse direction of the article.

10

18. An absorbent article as claimed in claim 1 substantially as hereinbefore described with reference to and as illustrated in any one of Figures 1 to 8 of the accompanying drawings.

19. An absorbent article as claimed in claim 10 substantially as hereinbefore described with reference to and as illustrated in Figure 9 of the accompanying drawings.

**THIS PAGE BLANK (USPTO)**

- 30 -

**Patents Act 1977**  
**Examiner's report to the Comptroller under**  
**Section 17 (The Search Report)**

Application number

GB 9300123.8

**Relevant Technical fields**

(i) UK CI (Edition K ) A3V

(ii) Int CI (Edition 5 ) A41B  
A61F

**Search Examiner**

D BUCKLEY

**Databases (see over)**

(i) UK Patent Office

(ii)

**Date of Search**

24 MARCH 1993

Documents considered relevant following a search in respect of claims 1 TO 19

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
A	US 4846823 (ENLOE) see eg lines 3 to 28 of column 5	
A	US 4808177 (DES MARAIS) see eg line 59 of column 3 to 14 of column 4	

Category	Identity of document and relevant passages	Relevant to claim(s)

#### Categories of documents

X: Document indicating lack of novelty or of inventive step.

Y: Document indicating lack of inventive step if combined with one or more other documents of the same category.

A: Document indicating technological background and/or state of the art.

P: Document published on or after the declared priority date but before the filing date of the present application.

E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.

&: Member of the same patent family, corresponding document.

**Databases:** The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).

**This Page is Inserted by IFW Indexing and Scanning  
Operations and is not part of the Official Record**

## **BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ **BLACK BORDERS**
- ☐ **IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- ☐ **FADED TEXT OR DRAWING**
- ☐ **BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- ☐ **SKEWED/SLANTED IMAGES**
- ☐ **COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- ☐ **GRAY SCALE DOCUMENTS**
- ☐ **LINES OR MARKS ON ORIGINAL DOCUMENT**
- ☐ **REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- ☐ **OTHER:** \_\_\_\_\_

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.**

**THIS PAGE BLANK (USPTO)**